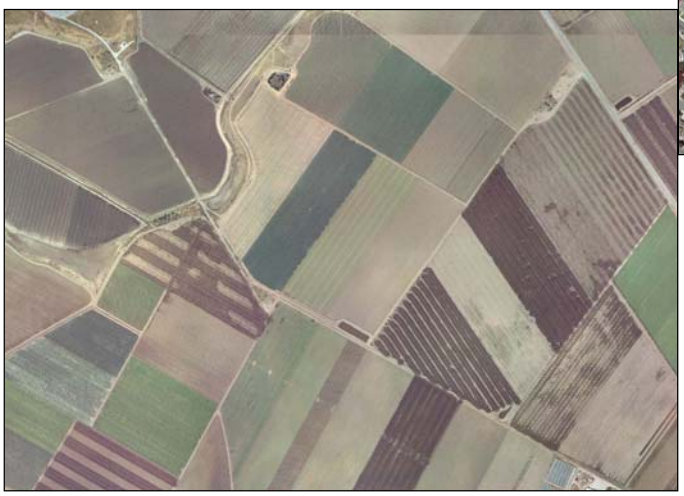
Summer 8-18-2016

2003 Monterey County Water Resources Agency Groundwater Extraction Summary Report



2003 Ground Water Extraction Summary Report

Monterey County Water Resources Agency

November 2005

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Front page photo source: City of Salinas (2002)

Overview of the Ground Water Extraction Reporting Program

History of the Ground Water Extraction Reporting Program
In February 1993, the Monterey County Board of Supervisors adopted Ordinance No. 3663 that required water suppliers within Zones 2, 2A and 2B to report water-use information for ground water extraction facilities and service connections. Ordinance No. 3717, which replaced Ordinance No. 3663, was adopted in October 1993; it modified certain other requirements in the old ordinance but kept the ground water extraction reporting requirements in place for wells with a discharge pipe having an inside diameter of at least three inches.

Monterey County Water Resources Agency (Agency) has collected ground water extraction data from well operators for water reporting years beginning November 1 and ending October 31, starting with the 1992-1993 water-reporting year. The information received from the over 300 well operators in the above-referenced zones of the Salinas Valley is compiled by the Ground Water Extraction Management System (GEMS) portion of the Water Resources Agency Information Management System (WRAIMS), a relational database maintained by the Agency. The intent of the ground water extraction reporting program is to measure and document the amount of ground water extracted from Zones 2, 2A, and 2B of the Salinas Valley Ground Water Basin each year.

Since 1991, the Agency has required the annual submittal of Agricultural Water Conservation Plans, which outline the best management practices that are adopted each year by growers in the Salinas Valley. In 1996, an ordinance was passed that requires the filing of Urban Water Conservation Plans. Developed as the urban counterpart of the agricultural water conservation plans, this program provides an overview of per capita water use and the best management practices being implemented by urban water purveyors as conservation measures.

2003 Ground Water Extraction Summary Report
The purpose of this report is to summarize the data collected in February 2004 from the following annual reporting programs: Ground Water Extraction Reporting (agricultural and urban), Water Conservation Plans (agricultural and urban), and Water and Land Use Information (agricultural). The *agricultural* data from the ground water extraction reporting program covers the water-reporting year of **November 1, 2002, through October 31, 2003**; the *urban* data covers **calendar year 2003**. The agricultural and urban water conservation plans adopted for 2004 are also summarized. This report is intended to present a snapshot of current water pumping within the Salinas Valley, including agricultural and urban water conservation improvements that are being implemented to reduce total water pumping. It is not the purpose of this report to thoroughly analyze the factors that contribute to increases or decreases in pumping.

Explanation of Reporting Methods
The ground water extraction reporting program allows water users to report water well extractions by one of three different measuring methods: water flowmeter, electrical meter, or hour meter (timer) data. The Agency requires regular pump efficiency testing to ensure the accuracy of the data reported. The summary of ground water extractions presented in this report is compiled from data generated from all three reporting methods.

Disclaimer Regarding Quality of Data
While the Agency has made every effort to ensure the accuracy of the data presented in this report, it should be noted that the data is submitted by the individual reporting parties and is not verified by Agency staff. In addition, since so many factors can affect the calculations, it is understood that no reporting method is 100 percent accurate. The Agency maintains strict quality assurance in the compilation, standardization and entry of the data received.

The Agency received Ground Water Extraction Reports from approximately ninety-seven percent (97%) of the 1714 wells in the Salinas Valley for the 2002-2003 (2003) water-reporting year. Agricultural and Urban Water Conservation Plan submittals for 2004 were ninety percent (90%) and ninety-five percent (95%), respectively.

Notes Regarding Data Reporting Format
Ground water extraction data is presented in this report by measurement in acre-feet. One acre-foot is equal to 325,851 gallons.

Ground Water Extraction Data Summary

The Agency has designated subareas of the Salinas Valley Ground Water Basin whose boundaries are drawn where discernible changes occur in the hydrogeologic conditions. These boundaries are shown in Figure 1.

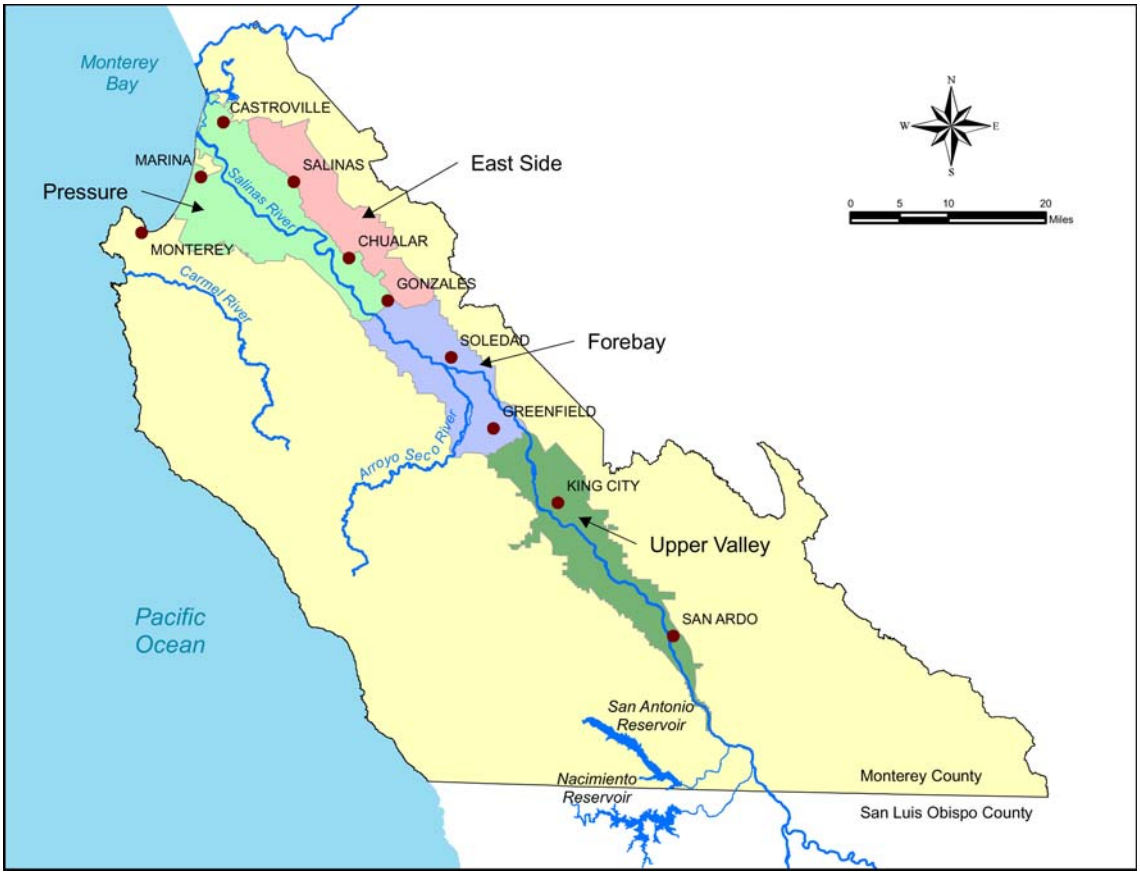

Figure 1: Salinas Valley subareas

Summary of Methods Used for Extraction Reporting

The distribution of methods used for extraction reporting for the 2003 water-reporting year is shown in Table 1; a percentage distribution by volume is shown in Figure 2.

Table 1. Total extraction data by reporting method

Reporting Method	*Acre-Feet per Reporting Method*	*Wells per Reporting Method*
Water Flowmeter	315,851	1,145
Electrical Meter	176,156	545
Hour Meter	9,329	24
Total	**501,336**	**1,714**
Average ('95-'03)	**506,160**	**1,684**

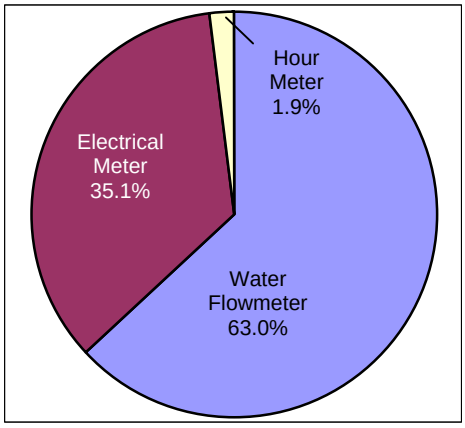

Figure 2: Percentage by volume of methods used for extraction reporting

Ground Water Extraction Data Summary (continued)

Total Extraction Data by Subarea and Type of Use

The total ground water extractions for the 2003 water-reporting year are summarized by hydrologic subarea, type of use (agricultural and urban in Table 2) and percentage of use (Figure 3).

Table 2. Total extraction data by subarea and type of use

Subarea	*Agricultural Pumping (acre-feet)*	*Urban Pumping (acre-feet)*	*Total Pumping (acre-feet)*
Pressure	97,947	23,236	121,183
East Side	88,763	14,675	103,438
Forebay	141,778	7,936	149,714
Upper Valley	122,376	4,625	127,001
Total	**450,864**	**50,472**	**501,336**

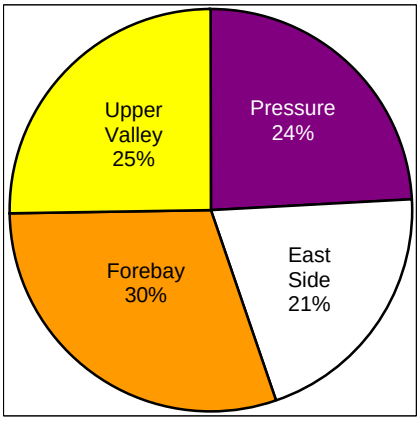

Figure 3: Percentage of total extractions by subarea

Urban Extraction Data by City or Area

The total ground water extractions attributed to urban (residential, commercial/institutional, industrial, and governmental) pumping for the 2003 water-reporting year are summarized by city or area in Table 3. Figure 4 is a graphic representation of each city or area's percentage of the total urban pumping for 2003.

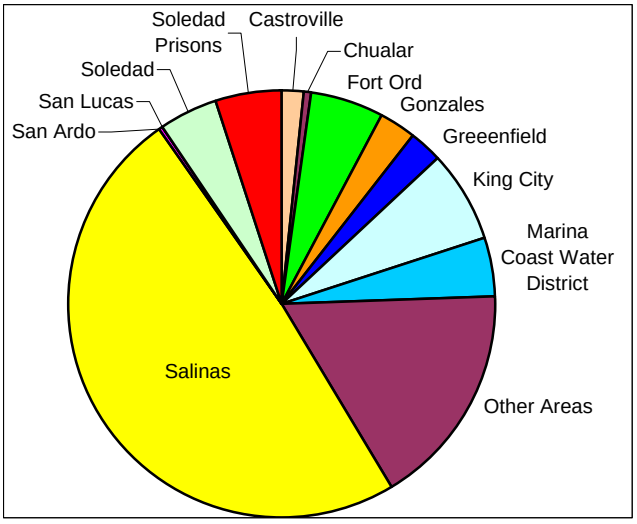

Figure 4: Percentage representation of urban extraction by city or area

Table 3. Urban extraction data by city or area

City or Area	*Urban Pumping (acre-feet)*	*Percentage of Total*
Castroville	902	1.8%
Chualar	159	0.3%
Fort Ord	2,819	5.6%
Gonzales	1,391	2.8%
Greeenfield	1,250	2.5%
King City	3,643	7.2%
Marina Coast Water District	2,175	4.3%
Other Areas	8,519	16.9%
Salinas	24,661	48.8%
San Ardo	131	0.3%
San Lucas	73	0.1%
Soledad	2,184	4.3%
Soledad Prisons	2,565	5.1%
Total	**50,472**	**100.0%**

Agricultural Water Conservation Plans

The Agricultural Water Conservation Plans include net irrigated acreage, irrigation method, and crop category. This information reflects the changing trends in irrigation methods in the Salinas Valley. Tables 4, 5, 6 and 7 show the distribution of irrigation methods by crop type for 1993, 2002, 2003 and 2004, respectively.

Table 4. 1993 - net acre distribution of irrigation methods by crop type based on N/A[1] % companies reported

1993	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[2]*	*Total*
Vegetables	2,349	84,060	30,764	6,607	3,827	3,682	0	131,289
Field Crops	575	2,173	2,236	90	50	48	0	5,172
Berries	1	0	0	0	0	4,158	0	4,159
Grapes	261	0	0	13,347	0	15,976	0	29,584
Tree Crops	0	0	122	251	0	1,216	10	1,599
Forage	41	202	1,327	0	48	0	189	1,807
Unirrigated								N/A
Total	**3,227**	**86,435**	**34,449**	**20,295**	**3,925**	**25,080**	**199**	**173,610**

Table 5. 2002 - net acre distribution of irrigation methods by crop type based on 75% companies reported

2002	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[2]*	*Total*
Vegetables	1,141	53,688	18,458	4,625	1,878	13,251	3,200	96,241
Field Crops	32	670	612	386	0	0	0	1,700
Berries	0	0	54	54	127	2,746	0	2,981
Grapes	8	0	820	2,761	0	27,970	195	31,754
Tree Crops	0	0	280	64	0	333	0	677
Forage	27	44	649	207	0	0	14	941
Unirrigated								2,948
Total	**1,208**	**54,402**	**20,873**	**8,097**	**2,005**	**44,300**	**3,409**	**137,242**

Table 6. 2003 - net acre distribution of irrigation methods by crop type based on 79% companies reported

2003	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	*Drip*	*Other[2]*	*Total*
Vegetables	1,601	54,712	21,941	5,636	2,205	28,206	0	114,301
Field Crops	312	930	332	981	0	20	0	2,575
Berries	0	0	0	88	0	4,851	0	4,939
Grapes	8	0	0	2,797	0	31,175	0	33,980
Tree Crops	0	2,595	0	378	20	2,273	0	5,266
Forage	27	0	245	217	0	0	522	1,011
Unirrigated								630
Total	**1,948**	**58,237**	**22,518**	**10,097**	**2,225**	**66,525**	**522**	**162,702**

Table 7. 2004 - net acre distribution of irrigation methods by crop type based on 90% companies reported

2004	*Furrow*	*Sprinkler & Furrow*	*Hand Move Sprinklers*	*Solid Set Sprinklers*	*Linear Move*	Drip	*Other[2]*	*Total*
Vegetables	2,001	46,325	28,221	7,641	1,659	29,800	350	115,997
Field Crops	286	1,178	1,774	1,187	0	2,298	0	6,723
Berries	290	233	113	0	0	4,303	0	4,939
Grapes	8	0	300	1,653	0	32,526	0	34,487
Tree Crops	0	0	0	456	0	1,778	0	2,234
Forage	18	30	261	26	0	16	7	358
Unirrigated								3,029
Total	**2,603**	**47,766**	**30,669**	**10,963**	**1,659**	**70,721**	**357**	**167,767**

[1] "N/A" - % companies reported are unavailable for 1993
[2] "Other" may include an irrigation system not listed here or a different combination of systems
NOTE: Percent companies reported varies from year to year

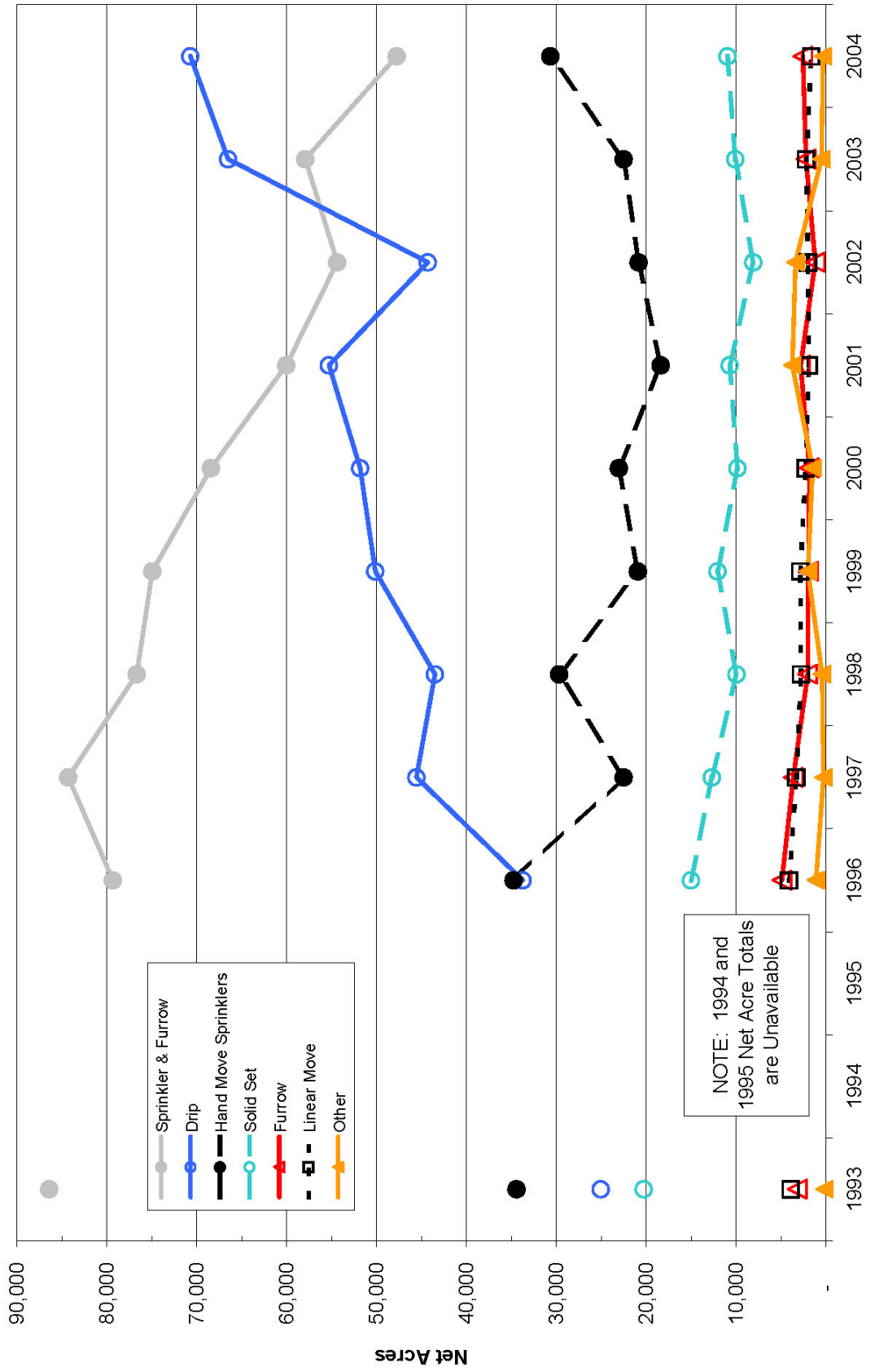

Figure 5: Types of irrigation methods used in the Salinas Valley based on companies reported

NOTE: Reported net acres vary from year to year

Agricultural Water Conservation Plans (continued)

Since 1991, Salinas Valley growers have submitted Agricultural Water Conservation Plans to the Agency. Table 8 shows the number of acres, by year, for selected "Best Management Practices," or water conservation measures, which have been implemented over the past nine years.

Table 8. Agricultural "Best Management Practices" implemented from 1996 through 2004

Best Management Practices (BMP)	Net Acres[1]								
	1996	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*
12 Months Set Aside	3,123	3,508	2,058	1,332	1,396	2,363	3,940	2,742	6,012
Summer Fallow	6,208	2,241	2,277	3,657	3,511	1,532	2,652	2,278	2,025
Flowmeters	126,031	122,475	132,225	124,963	127,454	125,624	106,739	124,342	133,349
Time Clock/Pressure Switch	137,297	135,954	137,414	130,863	130,298	124,427	116,062	133,405	140,167
Soil Moisture Sensors	51,428	56,936	58,854	62,357	58,975	56,148	45,927	50,460	49,328
Pre-Irrigation Reduction	99,429	104,203	101,649	89,454	93,733	82,791	80,501	90,878	93,094
Reduced Sprinkler Spacing	78,925	78,142	81,856	75,884	74,245	68,963	61,607	76,691	82,292
Sprinkler Improvements	116,809	110,523	108,507	98,409	95,356	89,505	85,302	110,194	102,041
Off-Wind Irrigation	113,381	111,076	102,873	102,433	101,828	93,387	91,706	111,278	111,862
Leakage Reduction	119,727	125,334	120,006	114,882	106,917	95,304	95,217	121,890	118,125
Micro Irrigation System	37,991	42,367	40,893	48,562	55,292	55,261	44,078	58,742	62,796
Surge Flow Irrigation	19,772	20,507	16,192	18,468	15,796	10,677	7,084	8,538	6,708
Tailwater Return System	22,707	21,121	22,803	23,597	23,773	26,236	25,263	23,914	27,653
Land Leveling/Grading	64,164	65,143	57,625	58,679	61,001	54,319	56,361	69,420	71,682

[1] Due to unique crop rotations, it is difficult to account for each BMP used on total Crop Acres; therefore Net Acres were used.

Water and Land Use Form

Summary of Reported Unit Agricultural Water Pumped by Subarea

Table 9 presents the average unit agricultural water pumped (acre-feet/acre) by subarea, calculated using the reported acreage and water pumped from the 2002-2003 Water and Land Use Form. The data accounts for all crop types reported, including nurseries, and all reporting methods: Water Flowmeter, Electrical Meter and Hour Meter.

Table 9. Reported unit agricultural water pumped by subarea

Subarea	*Pressure*	*East Side*	*Forebay*	*Upper Valley*	*Overall Average*
Unit Water Pumped (acre-feet/acre)	**1.7**	**1.8**	**2.3**	**2.4**	**2.1**

Changing weather patterns and variable soil and crop types affect the amount of water needed for efficient irrigation. Even during a normal rain year, pumping rates will vary from one area to another and crop types will vary depending on economic demand.

NOTE: Table 9 data should not be compared to the 1995 through 1999 Summary Reports because this table contains a larger data set; comparison to previous data could cause inaccurate conclusions.

Urban Water Conservation Plans

Since 1996, the Agency has been collecting data for the Urban Water Conservation Plan program. Table 10 shows the implementation of "Best Management Practices," for the past five years, as a percentage of total acreage reported. It is important to note that, while all of the listed practices apply to "large" water systems (200 or more customer connections), not all apply to "small" water systems (between 15 and 199 customer connections). The practices that apply *only* to large systems are printed in **bold** below.

Table 10. Urban "Best Management Practices" implemented from 2000 through 2004

Best Management Practices	***2000***	***2001***	***2002***	***2003***	***2004***
Provide speakers to community groups and media	**43%**	**65%**	**94%**	**77%**	**71%**
Use paid and public service advertising	**43%**	**63%**	**90%**	**77%**	**74%**
Provide conservation information in bill inserts	48%	88%	82%	56%	65%
Provide individual historical water use information on water bills	50%	69%	84%	88%	77%
Coordinate with other entities in regional efforts to promote water conservation practices	51%	91%	84%	85%	91%
Work with school districts to provide educational materials and instructional assistance	**43%**	**72%**	**94%**	**54%**	**33%**
Implement requirements that all new connections be metered and billed by volume of use	93%	93%	91%	90%	95%
Establish a program to retrofit any existing unmetered connections and bill by volume of use	58%	92%	55%	69%	49%
Offer free interior and exterior water audits to identify water conservation opportunities	**8%**	**81%**	**55%**	**75%**	**58%**
Provide incentives to achieve water conservation by way of free conservation fixtures (showerheads, hose end timers) and/or conservation "adjustments" to water bills	**39%**	**65%**	**89%**	**73%**	**35%**
Enforcement and support of water conserving plumbing fixture standards, including requirement for ultra low flush toilets in all new construction	**13%**	**70%**	**95%**	**95%**	**95%**
Support of State/Federal legislation prohibiting sale of toilets using more than 1.6 gallons per flush	64%	90%	85%	89%	96%
Program to retrofit existing toilets to reduce flush volume (with displacement devices)	48%	64%	45%	42%	56%
Program to encourage replacement of existing toilets with ultra low flush (through rebates, incentives, etc.)	**39%**	**65%**	**87%**	**71%**	**71%**
Provide guidelines, information, and/or incentives for installation of more efficient landscapes and water-saving practices	51%	67%	64%	87%	93%
Encourage local nurseries to promote use of low water use plants	45%	84%	82%	39%	3%
Develop and implement landscape water conservation ordinances pursuant to the "Water Conservation in Landscaping Act"	**41%**	**44%**	**65%**	**56%**	**51%**
Identify and contact top industrial, commercial, and/or institutional customers directly; offer and encourage water audits to identify conservation opportunities	**6%**	**30%**	**56%**	**53%**	**4%**
Review proposed water uses for new commercial and industrial water service, and make recommendations for improving efficiency before completion of building permit process	**45%**	**45%**	**69%**	**80%**	**10%**
Complete an audit of water distribution system at least every three years as prescribed by American Water Works Association	52%	70%	57%	20%	76%
Perform distribution system leak detection and repair whenever the audit reveals that it would be cost effective	56%	94%	90%	21%	77%
Advise customers when it appears possible that leaks exist on customer's side of water meter	93%	93%	91%	93%	96%
Identify irrigators of large landscapes (3 acres or more) and offer landscape audits to determine conservation opportunities	**32%**	**47%**	**60%**	**52%**	**4%**
Provide conservation training, information, and incentives necessary to encourage use of conservation practices	**32%**	**83%**	**56%**	**55%**	**8%**
Encourage and promote the elimination of non-conserving pricing and adoption of conservation pricing policies	56%	30%	87%	43%	20%
Implementation of conservation pricing policies	54%	30%	62%	43%	21%
Enact and enforce measures prohibiting water waste as specified in Agency Ordinance No. 3932 or as subsequently amended, and encourage the efficient use of water	41%	94%	86%	71%	83%
Implement and/or support programs for the treatment and reuse of industrial waste water / storm water / waste water	**45%**	**34%**	**63%**	**42%**	**37%**

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